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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/719,840	11/21/2003	John Stanley Lovell	2060-95	2970
22442	7590	06/07/2004	EXAMINER	
SHERIDAN ROSS PC 1560 BROADWAY SUITE 1200 DENVER, CO 80202			ROGERS, DAVID A	
			ART UNIT	PAPER NUMBER
			2856	

DATE MAILED: 06/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/719,840

Applicant(s)

LOVELL ET AL.

Examiner

David A. Rogers

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-75 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-75 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because it does not fully set forth the description of the invention. The following is a recommendation for the new abstract that will be consistent with the applicant's related international application:

The invention is directed to a system and method for detecting substances, such as high boiling and low vapor pressure materials, using high energy radiation imparted by a suitable radiation source, such as a strobe or laser over a short time period. The radiation source causes the materials to vaporize. A system handling system is used in conjunction with a detector to detect the presence of the materials including explosives, explosive-related compounds, chemical warfare agents, drugs, toxic industrial compounds, and derivatives thereof.

Appropriate correction is required. See MPEP § 608.01(b).

Claim Objections

2. Claims 9 and 34 are objected to because of the following informality. The claims should read --about 2×10^{-3} mm Hg--. Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary

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skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-9, 12, 13, 15, 22-24, 26-34, 37, 38, 40, 47-50, 51-59, 62, 63, 65, and 72-75 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent 5,092,155 to Rounbehler *et al.* in view of United States Patent 5,751,897 to Van Alstyne.

Rounbehler *et al.* teaches a hand-held, high-speed apparatus for the detection of vapors from specific compounds such as explosives. Specifically, the apparatus is used to detect explosive compounds that contain a nitro (-NO) or nitrite (-NO₂). In particular, Rounbehler *et al.* teaches that:

Detection of vapors such as explosives, as disclosed herein, is based on trapping and concentrating small amounts of vapor given off by explosives or stripped from surfaces contaminated by trace amounts of explosives, decomposing the concentrated vapors to produce nitric oxide gas (NO), and then detecting the NO from the decomposed vapors. It is essential to and a major feature of the vapor detection system that it is highly selective. Even when used to monitor air samples containing minute quantities of explosives (1 part in 10¹⁴ or less) and considerably higher concentrations of nitrogen oxides and non-explosives which could yield NO upon heating, the detector systematically avoids response to all compounds which are not of interest and correctly identifies the explosives. (Column 3, lines 7-21)

and

Explosives to be monitored all contain nitrogen, and most include one or more nitrite (-NO₂) functional groups, typically attached to a carbon, nitrogen, or oxygen atom.

Examples of explosives of interest are trinitrotoluene (TNT), dinitrotoluene (DNT), nitroglycerin (NG), pentaerythritol tetranitrate (PETN), ethylene glycol dinitrate (EGDN), cyclotetramethylene tetranitramine (HMX), cyclo 1,3,5-trimethylene-2,4,6-trinitramine (RDX), and water gels (ammonium nitrate plus additives). (Column 3, lines 30-40)

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Of the above list, trinitrotoluene (TNT), also known as 2,4,6-trinitrotoluene, has a boiling point of about 240 °C and a vapor pressure of about 2×10^{-4} mm Hg at 20 °C. See "Recommendation to List 2,4,6-Trinitrotoluene (TNT) as a Potential Toxic Pollutant" to Lewis. Dinitrotoluene (DNT), also known as 2,4-dinitrotoluene, has a boiling point of about 300 °C and vapor pressure of 1.1×10^{-4} mm Hg at 20 °C. See "2,4-Dinitrotoluene Material Safety Data Sheet" to Toxic Air Contaminant Identification.

The hand held detector is shown in figures 10-12. The detector is a portable gun (reference item 120) comprising batteries; a barrel-like housing (reference item 124); a pistol-grip handle (reference item 126) with a trigger (reference item 128) to operate a blower (reference item 130) and lamps (reference item 132) mounted in the inlet of the gun. The front end of the housing terminates in an inlet (reference item 136) leading to a central bore (reference item 138) for receiving a sample collector assembly (reference item 140). The central bore of the gun is connected to the blower which draws air samples through the collector, and it may be desirable, though not illustrated herein, to utilize the exhaust of the blower to form air jets which may be directed at a surface to aid in heating the surface and dislodging vapors from the surface.

The operation of the blower is controlled by the trigger, which may be a double or two-position trigger to permit separate activation of the blower and the lamps. The lamps may comprise four gold-plated projection bulbs and will

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aid in acquisition of samples. The lamps can be activated for very short time periods, such as 0.2 (1/5th) seconds, near an object to be sampled in order to heat the surface which raises the vapor pressure of any explosives thus heated and may also vaporize moisture or water containing explosives particles. The activation of the lamps along with the blower desorbs and strips explosives vapors from the surface without decomposing the vapors. The explosives vapors are drawn into the gun and trapped within the collector.

Rounbehler *et al.* also teaches that heating means other than the lamps can be provided, such as hot air jets, high speed flash lamps (whose very rapid heating may avoid loss of heating by conduction by a metal surface), irons which heat by direct contact, and microwave devices. Rounbehler *et al.*, however, does not expressly teach the use of a strobe operating between 1,200 to 4,800 Joules for about 1/1000th of a second.

Van Alstyne teaches a hand held apparatus for vaporizing and removing components on a surface. The hand-held device (reference item 4) is a housing that generally contains a flash tube (reference item 36) that can generate energy in the range of 3,750 Joules. The light emitted will components in the visible light spectrum and the near infrared spectrum (column 3, lines 7-60). The visible spectrum includes wavelengths in the range of 400 nm to 750 nm. The infrared spectrum includes the wavelengths in the range of 750 nm to 1,000,000 nm (1000 μ m). Near infrared is typically limited to a upper wavelength of about 2500 nm - 3000 nm (2.5 μ m to 3.0 μ m). Therefore, the apparatus of Van Alstyne operates in the wavelength range between the

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claimed range of 400 nm to 30 μm . In operation controls (reference item 26) are used to provide periodic pulses of light to the surface. The light has a pulse duration between $1/400^{\text{th}}$ to $1/800^{\text{th}}$ of a second. The repeat rate is between 0.1 Hz and 0.83 Hz, which is faster than the claimed minimum of 0.5 Hz. Van Alstyne further teaches that, when properly adjusted, the device can emit energy at about 2000 °C in order to transform the contaminants into a gas phase (column 8, lines 54-63). Van Alstyne also teaches that other pulse widths, repetition rates, and energy level per pulse can be used.

In both Rounbehler *et al.* and Van Alstyne the devices must be held very close to the surface in order to vaporize the compounds. This is further evidenced by figures 4A and 4B of Van Alstyne where it can be seen that the hand held device is very close to the surface (reference item 30). The applicant's choice of having a distance of 2 cm - 5 cm is a matter of choice and would be selected based on the energy output of the lamp and the suction pressure of the pump drawing the air into the detector.

Also, choosing an energy level where the peak of the profile is located in a radiation adsorbtion band of the material is an obvious choice. This would mean that the maximum amount of energy will be adsorbed by the compound of interest so that the maximum number of particles, if present, are released from the surface and transferred to the detector. Choosing an energy profile that was not "tuned" to the explosive being detected would result in a large risk that the explosives would remain undetected.

Modifying the device of Rounbehler *et al.* with the teachings of Van Alstyne would allow the contaminants, such as the explosives listed above, to be easily and quickly vaporized and subsequently drawn into the detector. This rapid screening would be beneficial for process-line detection such as the screening of baggage and personnel prior to boarding aircraft.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Rounbehler *et al.* with the teachings of Van Alstyne in order to provide an explosive detector comprising a high-speed flash lamp operating between 1,200 to 4,800 Joules for about 1/1000 of a second, and where the flash lamp has a repeat rate of at least 0.5 Hz.

5. Claims 10, 11, 14, 35, 36, 39, 60, 61, and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rounbehler *et al.* in view of Van Alstyne as applied to claims 1, 26, and 51 above, and further in view of United States Patent 6,477,907 to Chambers *et al.* and United States Patent 5,942,699 to Ornath *et al.*

Rounbehler *et al.* in view of Van Alstyne teaches that it is known to use a high-energy flash lamp to volatilize compounds on a surface in order to test for explosives. Rounbehler *et al.* in view of Van Alstyne does not teach the use of a volatilizing agent applied to the surface prior to the use of the lamp.

Ornath *et al.* teaches that it is known to use a heated solvent sprayed using sprayers (reference items 46 and 46') at a surface (reference item 70) in order to decrease the attractive forces between the particles and the surfaces

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on which they are located. It is further taught that the solvents increase the average momentum transfer to the surface in order to dislodge the compounds (column 2, lines 35-54). The air and the compounds are they extracted from the chamber into a collection device (reference item 52) using a vacuum pump (reference item 50).

Chambers *et al.* teaches a device for testing for the presence of explosives in soil. The device (reference item 10) comprises an inner probe (reference item 14) exposed to the soil. The inner probe further comprises a solid phase adsorbant material (reference item 16) for adsorbing the explosive molecules. The device further comprises means (reference item 26) including a liquid reservoir and a pump for introducing a solvent to the around the inner probe. The solvent will be in contact with the surrounding soil and is preferred to be from the list of water, steam, methanol, ethanol, acetone, or acetonitrile (column 6, lines 15-36). Chambers *et al.* further states that the solvent is added by the means (reference item 26) to the soil in the area of contact between the soil and the sampler to enhance transfer of the explosive - indicating compounds potentially present in the soil and that it is further preferred to add the solvent at an elevated temperature to aid in solubilizing the compounds (column 7, lines 1-7).

Also, choosing an energy level where the peak of the profile is located in a radiation adsorbtion band of the solvent is an obvious choice in view of the use of the device of Rounbehler *et al.* in view of Van Alstyne. This would mean that the maximum amount of energy will be adsorbed by the solvent which is used

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to transfer the compounds of interest, if present, to the detector. Choosing an energy profile that was not “tuned” to the solvent would result in a large risk that the explosives would remain undetected.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Rounbehler *et al.* in view of Van Alstyne with the teachings of Ornath *et al.* and Chambers *et al.* in order to provide an explosive compound detector that utilizes a solvent such as water or ethanol sprayed at a surface in order to increase the number of compounds released from the surface to a detector.

6. Claims 16-21, 41-46, and 66-71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rounbehler *et al.* in view of Van Alstyne as applied to claims 1, 26, and 51 above, and further in view of United States Patent 6,558,626 to Aker *et al.*

Rounbehler *et al.* in view of Van Alstyne teaches that it is known to use a high-energy flash lamp to volatilize compounds on a surface in order to test for explosives. Rounbehler *et al.* in view of Van Alstyne does not teach the use of heated conduits that transfer the sample containing the compounds of interest to the detector.

Aker *et al.* teaches an apparatus for detecting explosives. The apparatus comprises an elongated tube (reference item 12) (known also as a capillary (reference item 13)) with a predetermined interior volume (reference item 18). The tube is connected to a pump (reference item 14) for transporting a carrier

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gas containing the compounds of interest through the tube. The capillary comprises at least four zones (reference items 40, 43, 46, and 60). The preconditioning zone (reference item 60) comprises a temperature controller (reference item 61a) and a temperature sensor (reference item 61b) to maintain the capillary's temperature between 90 °C and 250 °C. The preconditioning zone 60 is typically coated with a non-retentive coating (reference item 62) including various alkyl silanes, such as octadecyltrichlorosilane (OTS), 1,1,1,3,3,3-hexamethyldisilazane (HMDS) and decyltrichlorosilane. It is known that HMDS is a non-polar material. See "Dependence of the Glass Transition Temperature of Polymer Films on Interfacial Energy and Thickness" to Fryer *et al.*

Aker *et al.* teaches that the materials used in the construction of the capillary should not irreversibly bind target analyte molecules. Aker *et al.* also teaches that the capillary tube can be formed of glass or specific metals such as gold, some grades of stainless steel, silica glass, pyrex and quartz. In addition, thin layers of materials that render structural materials more inert to undesirable adsorption of target analytes may be applied to certain surface materials making them more suitable for use, and alkylsilanes are preferred for glass surfaces. Finally, Aker *et al.* teaches that the capillary is heated to a stable temperature in the range of 30 °C to 140 °C to prevent moisture condensation on the tube.

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It would have been an obvious choice to add a conduit to the device of Rounbehler *et al.* as this would allow the device to sample air from a larger distance, which could be required if the sampling point was not easily or safely accessible. Furthermore, it would be an obvious choice to heat the conduit to a temperature above the condensation temperature of the material to be detected. Failure to do so would cause the compounds to adhere to the walls thus giving false readings by the analyzer.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Rounbehler *et al.* in view of Van Alstyne with the teachings of Aker *et al.* in order to provide an apparatus for the detection of explosives that comprises a heated glass tube coated with a silanizing agent.


Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Rogers whose telephone number is (571) 272-2205. The examiner can normally be reached on Monday - Friday (0730 - 1600).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron E. Williams can be reached on (571) 272-2208. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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May 25, 2004


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